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EXAMINER

SUMMONS, BARBARA

ART UNIT PAPER NUMBER

2817

DATE MAILED: 09/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/823,648

Applicant(s)

UEDA ET AL.

Examiner

Barbara Summons

Art Unit

2817

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 8/18/04 (drawings).
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 4/14/04 & 8/18/04 (rpl. sheets) is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                                                                              |                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                                                  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                                         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>4/14/04</u> . | 6) <input type="checkbox"/> Other: _____                                                |

## **DETAILED ACTION**

### ***Drawings***

1. The replacement sheets of drawings were received on 8/18/04. These drawings are approved.

### ***Specification***

2. The disclosure is objected to because of the following informalities: On page 11, lines 5-15 do not make sense regarding the additional thickness being "not smaller" or "not greater" than the film thickness of the electrode fingers for the same reasons given in the § 112 rejection of claims 12 and 13 below.

Appropriate correction is required.

### ***Claim Objections***

3. Claims 1-8 and 11-13 are objected to because of the following informalities:

In each of claims 1-8 and 11-13, the parentheses enclosing the definition of lambda should be deleted since the parentheses could render the claims unclear as to whether or not the feature therein is a positive claim limitation. Parentheses should generally only be used in claims to enclose reference numerals from the drawings.

In each of claim 6 (on line 14), claim 7 (on line 16) and claim 8 (on line 16), note that "Thick" should be changed to - - a thick - - (see e.g. claim 1, on line 14).

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. § 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 12 and 13 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 13 recites "an additional thickness of  $0.35\lambda$  not greater than the film thickness of the plurality of electrode fingers" (see line 4-6). This feature is unclear because claim 13 depends from claim 12, and claim 12 recites "an additional thickness of  $0.05\lambda$  not smaller than..." the film thickness of the electrodes. That is, if  $0.05\lambda$  is greater than (i.e. "not smaller than") the thickness of the electrodes, how can  $0.35\lambda$  be smaller than (i.e. "not greater than") the thickness of the electrodes? Is the translation correct? Is  $0.05\lambda$  really greater than the film thickness of the electrode fingers? That is, where is the thickness of the electrode fingers disclosed in the specification?

In any claim rejections that may follow, the Examiner will disregard the recited relationship to the thickness of the electrode fingers and just use the recited relationship to lambda, such that an additional thickness between  $0.05\lambda$  and  $0.35\lambda$ , as disclosed on page 19, lines 10-15 of the specification, will be considered to anticipate the claims.

### ***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 2 and 3 are rejected under 35 U.S.C. § 102(b) as being anticipated by Noto U.S. 2002/0153970.

Figs. 2 and 3 of Noto disclose a surface acoustic wave (SAW) device comprising: a pair of reflectors 4 on a single crystal  $\text{LiTaO}_3$  piezoelectric substrate 2 (see e.g. section [0016]); and three sets 3a-3c of interleaved comb electrodes, having alternating regular electrode fingers 32 and dummy electrode fingers 33 (Fig. 3), are disposed between the reflectors; and a tip gap G between the top of each electrode 32 and the top of the opposed dummy electrode 33 is less than  $0.3\lambda$  but greater than zero (see section [0050]) so as to disclose all values no greater than  $0.2\lambda$ .

8. Claim 2 is rejected under 35 U.S.C. § 102(b) as being anticipated by Ohara JP 11-191720.

Fig. 1 of Ohara discloses a SAW device comprising: a pair of reflectors 31 on a single crystal piezoelectric substrate 1 (see section [0031] of the attached machine translation); a set of two comb-electrodes with alternating regular fingers 30a and dummy fingers 30b connected to the upper and lower bus bars such that the two comb electrodes are interleaved with each other; and a tip gap between the top of the electrode fingers 30a and a top of the opposed small/dummy electrode fingers 30b is between  $0.15\lambda$  and  $0.35\lambda$  (see section [0022]), which includes any values between  $0.15\lambda$  and  $0.2\lambda$  that are within the claimed range of "not greater than  $0.2\lambda$ ".

Note that although Ohara shows using the resonator of Fig. 1 in a ladder filter (Fig. 5) and a lattice filter (Fig. 9), the resonator of Fig. 1 is only used as resonators 2b and 2c in the ladder filter (section [0024]) and as resonators 40 and 41 in the lattice filter (section [0028]), such that "each resonator" (claims 4 and 5, lines 2-3) does not have the recited feature.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Taniguchi et al. U.S. 6,404,101 in view of Noto U.S. 2002/0153970.

Note that, even though Noto above already rejects claims 2 and 3, since the Taniguchi/Noto combination will have all of the features of Noto, claims 2 and 3 are also being included here so that each of the multiple dependent claims as they depend from claims 2 and 3 will also be included in this rejection.

Figs. 1, 3 and 8 of Taniguchi et al. disclose a SAW device comprising: a pair of reflectors 26/27 (Fig. 8) on a single crystal piezoelectric substrate 22 (see col. 13, lines 26-33); three sets of comb electrodes 23-25, each set having two interleaved comb electrodes (23a,23b/24a,24b/25a,25b); and a thick film 17 and 18 formed on a partial area of the bus bars (23c,23d/24c,24d/25c,25d).

Regarding claims 4 and 7, the resonator of Fig. 8 is used as each of the resonators in a ladder filter of Fig. 3 (col. 14, lines 39-53). Regarding claims 9, 12 and 13, the electrode fingers are formed of aluminum (col. 13, lines 38-39) and have a thickness of  $0.04\lambda$  (see e.g. col. 19, lines 51-53), and the thick films 17 and 18 on the bus bars have a thickness  $M$ , for example, of between  $0.063\lambda$  and  $0.188\lambda$  (col. 14, lines 4-9) dependent upon the material used as given by the equation at col. 14, line 26 also dependent on the gap  $g$ . Regarding claims 11 and 15, the gap  $g$  (Fig. 1) is the distance from where the thick films 17 and 18 are disposed to the connection end face of the bus bars, and the gap  $g$  is disclosed as small as  $0.1\lambda$  for a thick film formed of an insulating material of silicon dioxide (see col. 16, lines 36-56, especially lines 54-56). Regarding claim 10, the duty of the electrodes (i.e. ratio of electrode width to space there between) is 0.72 (see col. 15, lines 14-15). Regarding claim 14, the thick film can be formed of a heavy metal (see col. 19, lines 18-22) with the thickness  $M_a$  thereof and gap  $g$  fitting the equation utilizing the density given at col. 14, lines 33-38. Regarding claim 16, the device uses a "pseudo" (a.k.a. leaky) surface acoustic wave (see col. 8, lines 65-66).

However, Taniguchi et al. is silent as to the tip gap distance between the ends of the electrode fingers and the end faces of the bus bars, and does not disclose dummy electrodes or a lattice filter.

The Examiner takes Official Notice that a lattice filter would have been an obvious variation known in the art, and that what improvements work for ladder filters also work for the variant lattice filters as evidenced by the prior art of record (see e.g. Figs. 5 and 9 of Ohara applied above).

Noto discloses a tip gap between zero and  $0.3\lambda$  (see section [0050]) as discussed above, shows a specific example with  $0.2\lambda$  (section 0060)), and discusses that it would have been known to provide the smallest tip gap possible based on the manufacturing method (section [0051]) between the tops of the electrodes and the bus bar or opposing dummy electrodes in order to improve the device response by reducing the amount of free surface and therefore, reducing the generation of surface skimming bulk waves (see e.g. sections [0017]-[0020]).

Consequently, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the SAW device of Taniguchi (Figs. 8 and 3), if even necessary, by having provided the tip gap between the tops of electrode fingers and the end faces of bus bars or the tops of opposing dummy electrodes be not larger than  $0.2\lambda$ , as taught, for example, by Noto (section [0050]), because Taniguchi et al. is silent as to the tip gap, thereby suggesting that any known tip gap would have been usable therewith, and because Noto explicitly suggests a small tip gap including values not greater than  $0.2\lambda$  (sections [0051] and [0060]) and the inclusion of dummy electrodes, in order to reduce free surface which would have provided the benefit of improved device response due to the reduced generation of surface skimming bulk waves (see sections [0017]-[0020]). Additionally, one of ordinary skill in the art would have known that what improvements apply to resonators in ladder filters would have equal application to the extremely well known alternative filter arrangement of lattice filters.



**Conclusion**

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Plesski et al. U.S. 5,682,126 provides further evidence that ladder filter unit stages can be easily connected as lattice filters (see Fig. 2 and Fig. 9B), and discloses that use of leaky SAWs is an obvious modification (see col. 4, lines 19-23 and claim 18), and discloses a bus bar thicker than the electrodes (see e.g. claim 15).

Takamine et al. U.S. 203/0155993 discloses a SAW device with a resonator having a tip gap between an electrode and a dummy electrode less than  $0.5\lambda$  (see the abstract).

Taniguchi et al. U.S. 6,172,580 discloses a SAW ladder filter with the resonators having a tip gap less than  $1.0\lambda$  (see the abstract).

Tsutsumi et al. U.S. 2003/0117039 discloses a SAW ladder filter with resonators having dummy electrodes, and discloses a tip gap by disclosing the length of the dummy electrodes L and the lengths a and b (see Fig. 14), where  $a = b$  and  $a - L$  is the tip gap.

Inoue et al. U.S. 2003/0117240 discloses a SAW device with thicker bus bars (Figs. 15-17) and dummy electrodes (Fig. 18) as some of the resonators in a ladder filter (Fig. 24).

Takagi et al. U.S. 6,377,138 discloses a SAW device with thicker bus bars (see Fig. 6B) and a gap Z (Fig. 13) between the thick part and the end face of the bus bar, wherein the resonators can be used in a ladder filter (Fig. 24).

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Watanabe et al. U.S. 6,731,046 discloses a SAW resonator with bus bars thicker than the electrodes (see Figs. 1A and B and the last sentence of the abstract).

Tsutsumi et al. U.S. 6,121,860 discloses a SAW device with bus bars made thicker than the electrodes with a dielectric film (Figs. 12 and 13).

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Barbara Summons whose telephone number is (571) 272-1771. The examiner can normally be reached on M-Th, M-Fr.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bob Pascal can be reached on (571) 271-1769. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

bs  
September 7, 2005



**BARBARA SUMMONS  
PRIMARY EXAMINER**



FIG.1

